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180 square meter pasture area with fence or at least 6.0 sq. m pasture area per bird. Results of the study revealed that scavenging broiler chicken fed with home-mixed concentrates containing 20% banana rejects supplemented with malunggay leaf meal in combination with trichantera and/or mulberry leaf meal significantly improved ($P < 0.01$) performance in terms of average body weight, gain in weight, feed consumption and feed conversion efficiency. However, insignificant differences were obtained on the dressing percentage with and without giblets. In terms of return above feed cost, the birds fed with home-mixed concentrates containing 20% banana rejects supplemented with malunggay leaf meal in combination with trichantera and mulberry leaf meal obtained higher return than those without malunggay and trichantera/mulberry leaf meal. The results indicated that home-mixed ration containing 20% banana rejects with malunggay leaf meal in combination with trichantera leaf meal or mulberry leaf meal improved production efficiencies in broiler chicken raised under free-range and can be used safely as feed ingredients for broiler chicken diet.

Keywords: Scavenging; Concentrates; Supplements; Malunggay; Trichantera and Mulberry

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Effects of crude glycerin supplementation on feed intake and blood metabolites and hormone concentrations in goats.

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The aim of this study was to evaluate the effects of dietary crude glycerin (87.02% glycerol, 8.07% water, and <0.74% methanol) supplementation on feed intake, and blood metabolites and hormone concentrations in goats. Four, Thai Native x Anglo Nubian crossbred growing male goats with an average body weight of 26 ± 3.0 kg were housed in metabolism crates and randomly assigned according to a 4 x 4 Latin square design with four consecutive 21-d periods which consisted of 14-d adaptation and 7-d data collection. The dietary treatments were as follows: T1= crude glycerin (CG) at 0 % (control), T2= CG at 5%, T3= CG at 10%, and T4= CG at 20%. Crude glycerin replaced an equivalent amount of corn on a dry matter (DM) basis as an energy source in the ration and goats were fed unlimited amounts (ad libitum) as a total mixed ration (TMR). Based on this experiment, there were no significant differences ($p > 0.05$) among treatment groups regarding daily DMI (total DMI, % BW and g/kg BW^{0.75}). The rumen temperature, pH, blood glucose, BHBA and packed cell volume (PCV) were similar among treatments ($p > 0.05$), whereas plasma insulin were significantly ($p < 0.05$) higher as higher levels of CG were incorporated into diets. Blood urea nitrogen was similar among treatments ($p > 0.05$), except in T4 (20% CG) which had lower ($p < 0.01$) than other treatments. In conclusion, these results imply that CG can be fed to goats at 20% of dietary DM without negative effects on feed intake and blood metabolites when compared with goats not fed crude glycerin.

Keywords: Crude glycerin; Feed intake; Blood metabolites; Goats

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Wool quality traits, body conformation and liveweight measurement changes in ewe and wether lambs supplemented with

Spirulina (*Arthrospira plantensis*).

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Spirulina (*Arthrospira platensis*) is an edible cyanobacterium rich in protein and several essential fatty acids, amino acids, vitamins and minerals. This has raised its profile as a potential supplement in lamb production. Yet, the underpinning effects of Spirulina supplementation on lamb products such as wool and meat, interrelations vital to its applicability in the sheep industry is presently largely unknown. Therefore, our experimental objective was to evaluate the correlations between changes in wool quality traits, body conformation and liveweight measurements in lambs supplemented with Spirulina, as affected by sex and supplementation level. Over two consecutive years (2011-12) at the University Farm Cambridge, Tasmania, AUS, a mating ratio of 1 terminal ram to 100 Merino ewes was applied to produce approximately 1600 crossbred progeny. At 12 weeks of age, all progeny were weaned onto ryegrass pasture. At 6 months old, a total of 48 lambs were randomly selected for each feeding trial (24 per year). These were then randomly allocated into Spirulina supplementation treatment levels – CONTROL (0 mL), LOW (100 mL) or HIGH (200 mL), and balanced by sex (ewes and wethers). Each feeding trial continued for 9-weeks including 3-weeks of adjustment, during which Spirulina was directly supplemented daily to lambs via oral drenching as a water suspension with a 1:10 w/v ration of Spirulina (g) : Water (mL). All lambs received barley grain daily (150 g) and had ad libitum access to drinking water and a basal diet of ryegrass pasture throughout the trial. Individual lamb body conformation and live weight measurements were taken at the start and end of each feeding trial on chest girth (CG), wither height (WH), body length (BL), body condition score (BCS), and live weight (BWT). Mid-side wool samples were taken and analyzed for clean fleece yield (YIELD), mean fiber diameter (FD), coefficient of fiber diameter variation (CV), fiber diameter standard deviation (SD), comfort factor (CF), fiber curvature (CURV) and spinning fineness (SF). All data were transformed to changes (Δ) in wool quality traits over the feeding trial by subtracting final from initial measurements. SAS analysis for significant ($P < 0.05$) correlations between wool quality traits, body conformation and live weight measurements as influenced by Spirulina supplementation level and sex were investigated. It was observed in CONTROL lambs that Δ YIELD was negatively correlated with Δ BWT in wethers (-0.78) and with Δ BCS in both ewes (-0.86) and wethers (-0.91). CONTROL ewe Δ CG was positively correlated with Δ FD (0.82) and Δ SF (0.86), and negatively with Δ CF (-0.80). LOW Spirulina supplementation to ewe lambs showed no relationship between wool quality traits, body conformation and live weight measurements ($P > 0.05$). However, in wethers, Δ BCS and Δ CURV were negatively correlated (-0.90). In the HIGH Spirulina supplementation group, Δ YIELD was significantly correlated with Δ BL (0.86) and Δ BWT (-0.80) in wether and ewe lambs respectively. All other correlations were insignificant ($P > 0.05$). In conclusion, this study does not only demonstrate Spirulina's potential as a nutritious lamb supplement, but the relationships and strength of the correlations between wool, body conformation and live weight will assist in product management and serve as a tool for achieving desired wool and growth goals in sheep flocks.

Keywords: Spirulina; lambs; Gender; Wool quality; Growth